R E M A R K S

The presently claimed invention concerns a film for optical applications comprising (A) a hard coat layer which comprises a resin cured by an ionizing radiation and has a thickness in the range of 2 to 20 μm, (B) a high refractivity layer I which comprises a resin cured by an ionizing radiation and a metal oxide and has a refractive index in a range of 1.70 to 1.95 and a thickness in a range of 30 to 120 nm, (C) a high refractivity layer II which comprises a resin cured by an ionizing radiation and a metal oxide and has a refractive index in a range of 1.60 to 1.70 and has a thickness in a range of 5 to 70 nm and (D) a low refractivity layer which comprises a siloxane-based polymer and has a refractive index in a range of 1.37 to 1.47 and a thickness in a range of 60 to 180 nm, layers (A) to (D) being successively laminated on at least one face of a substrate film.

The film for optical applications of the present invention is a film for preventing reflection of light which is prepared in accordance with a wet process and, as described hereinabove, has a structure comprising (A) a hard coat layer, (B) high refractivity layer I, (C) high refractivity layer II, (D) a low refractivity layer and, optionally (E) an antifouling layer

disposed on layer (D), which are successively laminated on at least one face of a substrate film (see page 4, first paragraph of the specification). Each of the high refractivity layers I and II comprises a resin cured by an ionizing radiation and a metal oxide. The resins cured by an ionizing radiation in layers (B) and (C), together with the hard coat layer, are effective for improving scratch resistance. The metal oxides used in high refractivity layers I and II are used for adjusting the refractive indices of the layers.

Claims 1 and 4 to 9, 11 to 17 and 19 were rejected under 35 USC 103 as being unpatentable over Matsufuji et al. (USP 6,480,250) in view of Sopko (USP 6,436,541) for the reasons set forth on pages 2 to 5 of the Office Action.

It was admitted in the Office Action that Matsufuji et al. lack references to multiple high refractivity layers and the refractive index of the high refractivity layers.

Matsufuji et al. disclose a low-reflection transparent conductive multi layer film to be attached to the front panel of cathode-ray tubes or plasma displays comprising, in the order described, a transparent substrate, a hard coat layer, a transparent conductive layer containing particles comprising at

least one of a metal and a metal oxide, and at least one transparent protective layer which has anti-smudge properties, has a refractive index different from that of the transparent conductive layer and comprises a resin having a high dielectric power factor (see the ABSTRACT of Matsufuji et al.). The Matsufuji et al. reference is different from the present invention with respect to the following points.

(1) The transparent conductive layer 3 in Matsufuji et al. does not contain any of the binder resins recited in the applicants' claims, to say nothing of a resin cured by an ionizing radiation, which is one of the very important features of the presently claimed invention. The cured resin in the presently claimed invention is important to improve the scratch resistance of the film. Matsufuji et al. describe that "To secure high conductivity, it is preferred for the transparent conductive layer to consist substantially solely of conducive particles, *not containing non-conductive materials such as binder resin.*"

On page 8, the second paragraph of Response to Arguments in the October 31, 2003 Office Action, the following was stated:

> "Matsufuji teaches the use of a solvent, which is understood to be the same thing as a binder, in the conductive layer (col. 5, line 64 to col. 6, line 4). Further, Matsufuji teaches the particles dispersed in layer 3 (col. 10, lines 42 to 63) - therefore, some type of binder must be present."

For the following reasons, the applicants respectfully disagree with the above allegations, which are considered to be based on a misunderstanding of the terms "binder" and "solvent".

It is respectfully submitted that a person of ordinary skill in the art would understand that a "solvent" is not the same thing as a "binder". When a dispersion of some particles in a solvent, the particles being insoluble in the solvent, are coated on a film and the solvent is evaporated, only the particles remain on the surface of the film after drying. Nothing which "binds" the particles mutually or "binds" the particles onto the surface of the film remains. On the other hand, when a "binder" is contained in a solution, some material other than the "solvent" and the particles which existed in the solution and is effective to bind the particles mutually or to bond the particles to the surface of the film should remain after evaporation of the solvent. To assist in the understanding of these terms as used in the Office Action, attached herewith are relevant pages of a

document obtained from the following website: http://cage.rti.org/glossary.index.cfm. The document is entitled "Coatings Guide."

In the enclosed document, the term "binder" is defined as follows:

> "The solid (non-volatile) material in a coating that binds the pigment and additive particles together to form a film. In general, binders are resins."

Also in the enclosed document, the term "solvent" is defined as follows:

> "The liquid or blend of liquids used to dissolve or disperse the film-forming particles and which evaporate during drying."

As can be seen from the enclosed document, the terms "solvent" and "binder" are not equivalent.

In Matsufuji et al., it is taught to disperse metal or metal oxide particles in a solvent. Matsufuji et al. further teach that to secure high conductivity, it is preferred for the transparent conductive layer to consist substantially solely of conductive particles, not containing non-conductive materials

such as a binder resin (see column 5, lines 52 to 63 of Matsufuji et al.). Matsufuji et al. further teach that the transparent conductive layer containing the metal or metal oxide particles is formed by coating the hard coat with a dispersion of the metal oxide particles in a solvent mainly comprising water (see column 5, lines 64 to 67 of Matsufuji et al.).

In the Example in column 10, paragraph 1), Matsufuji et al. teach that the coating composition for the conductive layer is prepared by dispersing colloidal silver/palladium in a mixed solvent of water and isopropyl alcohol.

It is respectfully submitted that it would be apparent to a person of ordinary skill in the art that neither silver nor palladium is soluble in a mixture of water and isopropyl alcohol. Nothing other than the substances described above is added to prepare the coating composition for the conductive layer in Matsufuji et al.

It is understood from the above discussion that Matsufuji et al. preferred the transparent conductive layer to consist substantially solely of conductive particles (not containing non-conductive materials such as a binder resin) to obtain a good

conductivity, a surface resistivity of 10 kΩ/sq. or less (see column 5,. lines 26 to 28 of Matsufuji et al.) of the layer by a good contact of each of the particles of metal or metal oxide to satisfy some of the purposes of their invention, namely obtaining a transparent conductive multilayer film excellent in antistatic effect and electromagnetic wave shielding.

By no means does Matsufuji et al. teach the use of a binder resin in the transparent conductive layer, to say nothing of the use of a resin cured by an ionizing radiation in layer 3 of Matsufuji et al., which is disposed adjacent to the hard coat layer 2 of Matsufuji et al., and which is alleged in the Office Action to correspond to layer (B) of the presently claimed invention. It is respectfully submitted that the transparent conductive layer of Matsufuji et al. is substantially different from the high refractivity layer I of layer (B) of the presently claimed invention.

(2) In spite of the indication at the top of page 3 of the Office Action that "Matsufuji further teaches the inclusion of a *high refractivity layer (3)*", **Matsufuji et al. fail to teach or suggest that layer 3 is a "high refractivity layer".**

Similarly, Matsufuji et al. do not teach a "low refractivity layer", as recited in applicants' claims having a refractive index of 1.37 to 1.47.

Matsufuji et al. describe only that layer 3 is "a *transparent conductive layer 3* containing conductive particles" (column 3, lines 8 to 9 of Matsufuji et al.). Matsufuji et al. disclose some examples of the conductive metal oxide particles as follows: indium oxide, tin oxide, antimony oxide, zinc oxide, aluminum oxide, silicon oxide, iron oxide. Applicants have informed the undersigned that according to a search by the applicants, the refractive indices of these metal oxides were found to be as follows (shown in the parentheses next to the name of the oxides): indium oxide (2.0), tin oxide (2.0), antimony oxide (2.0), zinc oxide (2.0), aluminum oxide (1.63). silicon oxide (1.46) and iron oxide (2.5-2.7) (see the copy of Cheng-Chung Lee, pages 443 to 446, Kogakuhakumaku to Seimakugijutsu, (Optical Thin Film and the Method of Forming the Film), printed in Japan, 2002, by Seikosya, that was submitted with the AMENDMENT UNDER 37 CFR 1.111 dated July 28,2003). The refractive index of silicon oxide (1.46) is in the range of the low

refractivity layer (D) of the present invention. Matsufuji et al. describe only that the refractive index of layer 4 is *different* from the refractive index of layer 3 (ABSTRACT; column 7, lines 36 to 45 of Matsufuji et al.). **Matsufuji et al. are silent regarding the actual refractive index of layer 3.** It is evident that Matsufuji et al. do not intend that layer 3 is a high refractivity layer.

Sopko et al. disclose a four-layer antireflective coating in columns 9-10 and Fig. 8. The antireflective coating is supported over the substrate 25 and includes a first layer 49 deposited over the substrate 25, a second layer 51 deposited over the first layer 49 thereover, in turn having a third layer 27 deposited over the second layer 51. The first layer 49 is a high index layer relative to the substrate and the second layer 51 is a low index layer relative to the first layer 49 (column 9, lines 46-55 of Sopko et al.). The refractive index of the second layer 51 is less than the refractive index of third layer 27 and is preferably less than about 1.7 and most preferably is less than about 1.5. The refractive index of the first layer 49 is greater than the refractive index of the second layer 51, is preferably

higher than about 1.6 and most preferably is higher than about 1.8 (column 10, lines 3-81 and column 2, lines 58-65 of Sopko et al.). Although Sopko et al. do not disclose the actual value of the refractive index of the third layer 27 in columns 9-10, it is described that the third layer, which may correspond to the third layer 27, has a refractive index of 1.7 to 2.2 in an embodiment of at least a 4-layer anti-reflection coating (column 2, lines 54-67 of Sopko et al.)

Sopko et al. do not disclose to include a hard coat layer between the surface of the substrate 25 and the first layer 49. If this difference is disregarded, it is concluded that the refractive index of the third layer 27 of Sopko et al., which may correspond to the low refractivity layer (D) in the present invention, is higher than the refractive index of the second layer 51, which may correspond to the high refractivity layer II of the present invention. From this standpoint, Sopko et al. lack an essential feature of the present invention. As summarized hereinabove, it is a very important feature of the present invention that the refractive indices of two high refractivity layers and the low refractivity layer are defined in a manner so

as to be mutually connected to each other, thus attaining a low reflection of light (as well as good adhesion).

Sopko et al. disclose some examples of multilayer antireflective coatings. However, Sopko et al. do not disclose the use of a resin cured by an ionizing radiation in any of their layers, i.e., the transparent conductive oxide ("TCO") layers, moderately absorbing layers of low index layers (see column 12, lines 22 to 34 and the Examples of Sopko et al.).

From the discussion set forth above, it is apparent that neither Matsufuji et al. or Sopko et al. disclose the inclusion of a high refractivity layer I which comprises a resin cured by an ionizing radiation in layer (B), which is one of the very important features of the presently claimed invention.

The following is stated on page 3, lines 12 to 16 of the Office Action:

> "The "application of the high refractivity layers using the same technique as the hard coat disclosed in Matsufuji et al. would also have been within the ability of one of ordinary skill in the art and one would have been motivated to do so for the purpose of minimizing production costs by limiting the number of means used for depositing layers on a substrate."

Applicants respectfully rebut the above allegation based on the following reasons. The purpose of the hard coat layer in Matsufuji et al. is substantially different from the purpose of the high refractivity layer I of layer (A) of the present invention. Matsufuji et al. disclose to use fine particles or colloidal particles of metal oxides such as silica, alumina, zilconia or titania to have increased hardness. Moreover, Matsufuji et al. do not teach or suggest to have a hard coat layer having a limited range for the refractive index. One of ordinary skill in the art would thus not be motivated to utilize a high refractivity layer I of layer (A) of the presently claimed invention from the hard coat layer of Matsufuji et al.

On page 9, lines 12 to 14 of the Office Action, it was asserted that the "use of the deposition process is taught by Matsufuji et al. and, therefore, it is not necessary in the Sopko reference." However, Matsufuji et al. do not teach a deposition process of a transparent conductive layer which includes a resin cured by an ionizing radiation, as discussed in the foregoing argument.

In summary, both Matsufuji et al. and Sopko et al. do not teach or suggest a high refractivity layer containing a resin cured by an ionizing radiation. Matsufuji et al. do not teach or suggest a value for the refractive index of their transparent layer. Sopko et al. teach multiple high refractivity layers. However, Sopko et al. teach that the refractive index of the third layer must be greater than the refractive index of the second layer in their four-layer transparent protective layer. It is respectfully submitted that one of ordinary skill in the art would not consider combining Matsufuji et al. and Sopko et al. Based on the arguments set forth above, it is respectfully submitted that even assuming *arguendo* that the references were combinable, one of ordinary skill in the art would not be led to the presently claimed invention by combining Matsufuji et al. with Sopko et al.

With regard to the rejections for claims 4 to 8, 11 to 17 and 19 described on page 3, line 17 to page 5, last line of the Office Action, the applicants respectfully submit that these claims should be allowable because these claims are directly or indirectly dependent on claim 1 and it is respectfully submitted

that claim 1 has been shown to be allowable by the above remarks. However, the applicants wish to add the following comments which individually concern the reasons for the rejection of these dependent claims indicated in the Office Action.

Regarding claim 4, it was admitted in the Office Action that Matsufuji et al. lack reference to the high refractivity layer being made of tin doped with antimony. However, the position was taken in the Office Action that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have a high refractivity layer of antimony doped tin oxide as taught by Sopko et al. in Matsufuji et al. for the purpose of providing better antistatic qualities in the Matsufuji et al. film stack.

Applicants respectfully rebut the above allegation based on the following reasons. As discussed above, Matsufuji et al. do not describe a high refractivity layer, therefore, it is not certain what layer was intended in the Office Action to mean by a "high refractivity layer". If layer 3 was intended to be the "high refractivity layer," which would be presumed by the description at the top of page 3 of the Office Action, such

indication would not be correct, because the use of antimony doped tin oxide is in the high refractivity layer II in applicants' claim 4, not in the high refractivity layer I corresponding to layer 3 of Matsufuji et al. Similarly, Sopko et al. do not teach the use of antimony doped tin oxide in layer 51, which may correspond to the high refractivity layer II in applicants' claim 4. The use of antimony doped tin oxide in the high refractivity layer II is important in the presently claimed invention to obtain an excellent property for preventing reflection of light and also to attain an excellent adhesion between the high refractivity layer II and layer (D) (see page 12, line 14 bridging to page 13, line 9 of the present specification).

Regarding claim 5, it was alleged in the Office Action that Matsufuji et al. teach the low refractivity layer having antistatic properties (see the top of page 4 of the Office Action).

Applicants respectfully rebut the above position as set forth in the Office Action for the following reasons. Although Matsufuji et al. describe that the multilayer film is antistatic

because it has a transparent conductive layer containing conductive metal or metal oxide particles (see column 3, lines 16 to 18 of Matsufuji et al.), Matsufuji et al. do not describe that a "low refractivity" layer itself having antistatic properties. As previously discussed, Matsufuji et al. do not describe a "low refractivity layer." Further, the fact that the multi layer film is antistatic because it has a transparent conductive layer containing conductive metal or metal oxide particles and the fact that the low refractivity layer itself, if present, included in the antistatic multilayer film is antistatic are different concepts. Matsufuji et al. do not teach any of the layers other than their transparent conductive layer is antistatic.

Regarding claim 8, it was admitted in the Office Action that Matsufuji et al. lack specific reference to silanol.

Concerning claim 11, it was admitted in the Office Action that Matsufuji et al. lack reference to the refractive index of the high refractivity layer being within the claimed range.

With respect of claims 12 and 13, on page 5, lines 3 to 8 of the Office Action, the following was stated:

"Matsufuji teaches wherein the use of metal oxide particles dispersed in a resin, with the particles comprising 5-50 percent by volume (col. 5, lines 7-15). One of ordinary skill in the art would recognize that by selecting an appropriate combination of resin (col. 3, lines 31-38) and metal oxide (col. 5, lines 35-39) from the materials listed in Matsufuji one could achieve the claimed weight distribution between the resin and the metal oxide particles in any of the film layers."

Applicants respectfully rebut the above allegation based on the following reasons. There appears to be some confusion regarding the above statement in the Office Action. The volume percentage disclosed by Matsufuji et al. in column 5, lines 7 to 15 is for the percentage of metal oxide, as a filler, in the hard coat layer. The resins disclosed by Matsufuji et al. in column 3, lines 31 to 38 are the resins for the substrate. The metal oxide disclosed by Matsufuji et al. in column 5, lines 35 to 39 is the metal oxide for the transparent conductive layer (in which Matsufuji et al. do not teach the inclusion of any resins as discussed herein).

It is therefore respectfully submitted that one of ordinary skill in the art would not achieve applicants' claimed weight distribution between the resin and the metal oxide particles in

layers (B) or (C) from the teachings as indicated above in the Office Action.

With respect of claim 19, it was admitted in the Office Action that Matsufuji et al. lack reference to the use of tin oxide doped with antimony.

Claims 2, 3, 9, 10, 18 and 20 were rejected under 35 USC 103 as being unpatentable over Matsufuji et al. in view of Sopko et al. as applied in claim 1 above, and further in view of Okamura (USP 6,104,530) for the reasons set forth on pages 6 to 8 of the Office Action.

The applicants respectfully submit that claims 2, 3, 9, 10 and 18 should be allowable because these claims are directly or indirectly dependent on claim 1, and claim 1 has been shown above to be allowable hereinabove. However, the applicants wish to add the following additional comments to respond to the reasons for the rejection of these claims, as set forth in the Office Action.

Okamura et al. disclose transparent laminates which have high transparency and, moreover, excellent electromagnetic shielding characteristics and near-infrared cutting-off characteristics. Okamura et al. disclose optical filters for

displays using these transparent laminates. Such optical filters are formed by laminating a transparent electrically conductive layer composed of high-refractive-index transparent film layers (B) and metal film layers (C) consisting of a silver-containing alloy on one major surface of a transparent substrate (A) in such a way that a repeating unit comprising a combination of one high-refractive-index transparent film layer (B) and one metal film layer (C) is laminated three times or more, and further laminating one high-refractive-index transparent film, layer (B) thereon. The preferred embodiment of Okamura et al. is illustrated in Fig. 2 therein.

With regard to claim 2, it was admitted in the Office Action that Matsufuji et al., in combination with Sopko et al., do not teach a hard coat having antiglare properties. Moreover, Okamura et al. teach that the surfaces thereof (in particular, the surface opposite to the display) may be provided with a hard coat layer having antiglare properties. It is evident that "the surfaces" here means the surface opposite to the display or the surface at the side of the display (i.e., the surface of the substrate 11 opposite to the surface on which the transparent

electrically conductive layer 12 is disposed) and by no means to be between the substrate 11 and the transparent conductive layer 12. In contrast to Okamura et al., the hard coat layer in the present invention is disposed between the substrate and the high refractivity layer I.

Furthermore, Okamura et al. fail to teach the use of a resin cured by an ionizing radiation in the layers of the high-refractive-index transparent film layers (B) and the metal film layers (C). It is a very important feature of the present invention that the scratch resistance of the film is improved as a total effect of layers (A), (B) and (C), each of the layers containing a resin cured by an ionizing radiation.

With regard to claim 3, it was admitted in the Office Action that Matsufuji et al., in combination with Sopko et al., lack reference to the use of indium tin oxide at the one of the high refractivity layers. Furthermore, Okamura et al. fail to teach or suggest the use of a resin cured by an ionizing radiation to form the layer of indium oxide doped with tin. Matsufuji et al., as well as Sopko et al., do not teach the use of a resin cured by an ionizing radiation in the layers corresponding to the high

refractivity layer I of the presently claimed invention.

Concerning claims 9 and 10, it was admitted in the Office Action that Matsufuji et al. lack reference to the claimed refractive index of the hard coat layer.

Regarding claim 20, it was admitted in the Office Action that Matsufuji et al. lack reference to the multiple high refractivity layers and the refractive index of the high refractivity layers. It was also admitted in the Office Action that Matsufuji et al. further lack reference to the claimed refractive index of the hard coat layer.

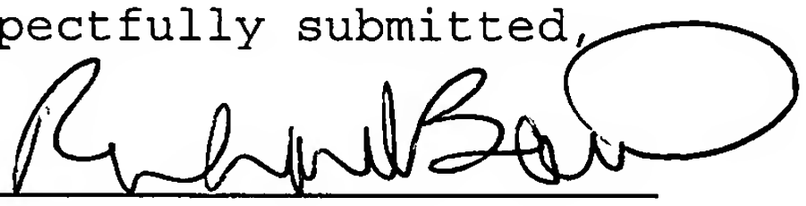
It is therefore respectfully submitted that the combination of Matsufuji et al. with Sopko et al. and Okamura et al. do not render obvious the presently claimed subject matter.

It is further respectfully submitted that the applicants' claimed invention is not rendered obvious over the references, either taken singly or combined in the manner relied upon in the Office Action in view of the many distinctions discussed hereinabove. It is moreover submitted that there are no teachings in the references to combine them in such a manner relied upon in the Office Action.

Reconsideration is requested. Allowance is solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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